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A Study of the Association Between Beta and Nonpension Postretirement Benefit Disclosures

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Abstract: The objective of this study is to examine the association between nonpension postretirement benefits (NPPRB) liability and systematic risk (beta) during the period of 1989 through 1991. This study has identified a sample of Statement of Financial Standards (SFAS) 106 adopters who were required to disclose the estimated NPPRB liability no later than calendar year 1993. Beta is modeled as a function of unlevered beta, debt, the NPPRB liability and equity. We find that investors recognized the NPPRB liability prior to 1992 and used this information in the assessment of systematic risk.

Introduction

The objective of this study is to examine the association between nonpension postretirement benefits (NPPRB) liability and systematic risk (beta) during the period of 1989 through 1991. Prior to 1985, firms were not required to disclose NPPRB information. For years after 1984, Statement of Financial Accounting Standards (SFAS) No. 81 ADisclosures of Postretirement Health Care and Life Insurance Benefits,@ required the disclosure of limited NPPRB information. Financial news articles published as late as 1987 suggested that both firms and investors were not fully aware of the magnitude of the NPPRB liability.

Many large firms provide benefits other than pension benefits to employees after retirement. These benefits include medical and dental care, life insurance, and other welfare benefits. The significant costs of these benefits have caused interested parties to become concerned about the availability of financial disclosures regarding the nature and cost of NPPRB. Prior to 1985, firms were not required to make any disclosures about NPPRB.

In July 1984 the Financial Accounting Standards Board (FASB) issued SFAS No. 81. This pronouncement required the disclosure of the cash expenditure for NPPRB and limited descriptive information related to NPPRB. The accounting standard change provided information which was potentially useful for making rough estimates of the NPPRB liability.

In December 1990 the FASB issued SFAS No. 106, ?Employers= Accounting for Postretirement Benefits other than Pensions,? which became effective for fiscal years beginning after December 15, 1992. SFAS 106 requires accrual accounting for NPPRB in a manner similar to that required for pension benefits. Prior to adoption of SFAS No. 106, firms used the cash basis for recording these expenses. SFAS No. 106 requires: (1) the disclosure of the liability for NPPRB and (2) the recognition of the related expense based on accrual (rather than cash basis) accounting.

The rest of the paper is organized as follows: Section II presents the related literature review. Section III introduces the research hypotheses and methodology. Section IV reports the empirical results. Section V summaries and presents suggestions for additional research.

Related Literature

Market Assessment of the NPPRB Liability

Grant (1989) provided the first reported study of the market valuation of NPPRB. Grant used an equity valuation model to test for a significant association between the market value of equity of the firm and independent variables which include (1) book value of assets and liabilities, (2) several pension liability measures, and (3) a firm=s NPPRB cash expenditure (which was used as the proxy for the NPPRB liability). The coefficient of the NPPRB cash expenditure variable was negative and significant for years 1984 through 1986. Grant concluded that the market recognized a liability for NPPRB as early as 1984 and used this information in pricing the stock of the firms.

Amir (1993) derived an equity valuation model in which market value of equity is expressed as a function of (1) earnings, (2) book value of equity, (3) the pension liability, and (4) the NPPRB cash expenditure. The coefficient of the NPPRB cash expenditure variable was not significantly different from zero for years 1984 through 1986 but was significant for years 1987 through 1990. Amir concluded that investors= perceptions of the liability changed in the years 1984 through 1990 as a result of the public debate over the proposed NPPRB benefit accounting standard.

Mittelstaedt and Warshawsky (1993) extended the research by Grant (1989) to study the association between market value of equity and the NPPRB liability. The NPPRB liability was measured by an estimate of the present value of the NPPRB liability. The coefficient on NPPRB liability was negative and significantly different from zero in the years 1986 through 1988. They concluded that the market recognized a liability for NPPRB and used this information in the determination of market value of equity.

Grant (1989), Amir (1993), and Mittelstaedt and Warshawsky (1993) provided evidence, albeit somewhat conflicting, that the market recognized a liability for NPPRB during years 1984 through 1990. The proxies for the NPPRB liability (such as the NPPRB cash expenditure or an estimate of the present value of the NPPRB liability) are useful in explaining cross-sectional variations in market value of equity. Given market recognition of the NPPRB liability, evidence of an association between the liability and systematic risk is of interest.

Systematic Risk and Debt

Dhaliwal (1986) examined the relationship between unfunded vested pension obligations (UVPO) and systematic risk. He used the following model derived by Rubenstein (1973):

$$\beta_L = \beta_U + \beta_U(1-t)(D/E) \quad (1)$$

where:

β_L = systematic risk of a levered firm,
β_U = unlevered systematic risk,
t = tax rate,
D = debt of the firm, and
E = equity of the firm.

Dhaliwal expanded the model to incorporate UVPO as a separate independent variable. He found that the coefficient of the UVPO variable was positive and significant and concluded that the market views unfunded pension liabilities as a form of debt and uses this information in assessing risk.

Gopalakrishnan and Sugrue (1990) extended Dhaliwal (1986) in order to examine the association between three pension liability measures (the unfunded vested pension liability, the unfunded accumulated benefit obligation, and the unfunded projected benefit obligation) and systematic risk. They reported significant positive coefficients for both (1) debt (excluding each pension liability measure) and (2) each pension liability measure.

Lukawitz et al. (1990) examined the relationship between noncurrent deferred taxes and systematic risk by disaggregating debt into three components: (1) long-term debt excluding noncurrent deferred taxes, (2) noncurrent deferred taxes, and (3) all other debts (primarily short-term payables). The relationship between noncurrent deferred taxes and systematic risk is modeled as:

$$\beta_L = \alpha_0 + \alpha_1\beta_U + \alpha_2\beta_U [D(1-t) + d - dt]/E + \alpha_3\beta_U(dt/E) + \varepsilon \quad (2)$$

where:

β_L = levered beta,
β_U = unlevered beta,
D = total long-term debt (including noncurrent deferred taxes),
dt = noncurrent deferred taxes,
d = all other debt items,
E = market value of equity, and
ε = error term.

This study adopted a model similar to Lukawitz et al. (1990) in order to examine the association of a firm=s NPPRB liability and its systematic risk.

Research Hypotheses and Methodology

Research Hypothesis

The first objective of this study was to determine whether estimates of NPPRB liability are used by the market in assessing systematic risk of provider firms. The first research hypothesis, stated in the alternative form, follows:

***H1*$_A$**: A positive association exists between the firm=s liability for NPPRB and the firm=s systematic risk.

The first research hypothesis was tested using the following model:

$$\beta = \alpha_0 + \alpha_1\beta_U + \alpha_2\beta_U(1\text{-}t)(DEBT/MVE) + \alpha_3\beta_U(1\text{-}t)(NPPRB/MVE) + \varepsilon \qquad (3)$$

where:

β = systematic risk of the firm,

β_U = unlevered beta,

DEBT = book value of debt (excluding the NPPRB liability),

MVE = market value of equity of the firm,

t = corporate tax rate, and

NPPRB = the unfunded nonpension postretirement benefit liability.

β and β_U were calculated over three-year periods ending in December 1989, 1990, and 1991. B was computed by regressing monthly firm returns on monthly market returns for three year periods ending in December of 1989, 1990, and 1991. DEBT/MVE and NPPRB/MVE were computed as average ratios over three-year periods ending in December of 1989, 1990, and 1991. The averaging procedure is consistent with the procedure of computing β and β_U which is using the three years of monthly observations. β_U was calculated similar to Hamada (1972) and Lukawitz et al. (1990) by regressing unlevered monthly returns for each firm (UR_{im}) on monthly market returns (R_{mm}):

$$UR_{im} = a + \beta_U(R_{Mm}) + \varepsilon \qquad (4)$$

where:

R_{Mm} = returns on an equally-weighted portfolio of stocks during month m,

and

$$UR_{im} = [CG_{im} + DIV_{im} + INT_{im}(1\text{-}t)\,] / [MVE + D(1\text{-}t)]$$

and where:

CG_{im} = capital gain of firm i during month m,

DIV_{im} = dividend of firm i during month m, and

INT_{im} = interest expense of firm i during month m.

Each of the variables used in the calculation of unlevered returns (capital gains, dividends, interest expense, market value of equity, and debt) was scaled by the number of common

shares outstanding.[1] The research model was used to test for significant regression coefficients for each individual years 1989, 1990, 1991, and as well as for pooled years 1989 through 1991. A *priori*, it is expected that the DEBT coefficient and the NPPRB coefficient will be positive and significant for the years included in this study. Based on prior research (Dhaliwal 1986; Gopalakrishnan and Sugrue 1990), no significant difference between the coefficients associated with DEBT and NPPRB was expected. The second hypothesis is stated as follows in the alternative form:

H2$_A$: The coefficient for the DEBT variable is not equal to the coefficient for the NPPRB variable (i.e., $\alpha_2 \quad \alpha_3$).

If the NPPRB liability had a positive impact on systematic risk and if the market recognized an NPPRB liability equal to the discounted amounts used in this study as the proxy for the unobservable amount, then the coefficients of the DEBT and NPPRB variables should not be different. Comparison of the DEBT and NPPRB coefficients may provide evidence of overestimation or underestimation of the NPPRB liability.

Sample Selection

The sample consists of firms for which the ratio of the NPPRB liability to the market value of equity at the end of December 1991 is greater than 8 percent.[2] NPPRB liability was estimated for years prior to 1991 by discounting the December 1991 liability back to years 1990, 1989, 1988, and 1987.[3] It was important to eliminate firms from the sample for which this procedure is least appropriate. Firms in the sample are limited to those which had relatively stable growth in total assets over the period 1988 to 1991.[4] Firms in the sample are further limited to those which had relatively stable leverage ratios during the period of 1988 to 1991.[5] This procedure results in a final sample size of 54 firms.

Note that both DEBT and NPPRB (the NPPRB liability) are multiplied by one minus the corporate tax rate in the research model. The average tax rate over years 1988 through 1991 for the sample used in this study is approximately 37 percent. The effective corporate tax rate is comparable to the findings in similar research of Dhaliwal (1986) and Gopalakrishnan and Sugrue (1990). Firms with effective tax rates which differed materially from 37% were excluded from the sample.[6] This restriction is imposed to limit the selection of firms to those most likely to benefit from tax deductions arising from future payments of postretirement benefits and to justify reduction of the NPPRB by the expected tax benefit. The sample was also reduced to eliminate firms with two classes of common stock or insufficient *Compustat* data. A summary of the sample selection criteria is presented in Table 1.

A summary of descriptive statistics for the sample is presented in Table 2. The median assets of the sample range from 2.790 billion to 3.107 billion dollars for years 1987 through 1991. Median debt over the same period ranged from 1.928 billion to 2.029 billion

Table 1
Sample Selection Criteria

Total Number of NPPRB providers		337
Less:	Providers with immaterial NPPRB*	202
	Deletions for Change in total assets over period of 1988-91	37
	Deletions for yearly changes in total assets	17
	Debt to market value of equity ration deletions	11
	Tax rate deletions	9
	Miscellaneous deletions	7
Final Sample Size		54

* - Providers with a ratio of postretirement benefit obligation to market value of equity less than 8 percent as of December 31, 1991.

dollars. The market model is used to calculate beta and unlevered beta for each firm.[7] For years 1989, 1990, and 1991, the median beta is approximately twice as large as the median unlevered beta. A *priori*, unlevered beta of a firm is expected to be less than beta of a firm. Table 3 lists the firms in the sample.

Results

Regression coefficients and statistics based on the research model (Model 3) are computed for years 1989, 1990, 1991, and for pooled years 1989 through 1991 (referred to as the ?pooled years@). Panel A of Table 4 shows that for years 1990, 1991, and the pooled years, the coefficients of unlevered beta, DEBT and NPPRB are positive and significant at an alpha level of 5 percent. For year 1989, the coefficients of unlevered beta and DEBT are positive and significant; however, the coefficient of NPPRB is positive and had a p-value of 15 percent.[8] These results provide evidence that investors recognized the NPPRB liability and used this information in assessing systematic risk. The insignificant coefficient for NPPRB in 1989 can be explained as the result of measurement error in discounting of the NPPRB liability from year 1991 to year 1987. Thus, these results support the a *priori* expectations of the positive relationship between the NPPRB liability and systematic risk.

In addition to testing for significant regression coefficients for the DEBT and NPPRB variables, the DEBT and NPPRB coefficients were tested for equality. Prior research (Dhaliwal 1986; Gopalakrishnan and Sugrue 1990) tested for the equality of regression coefficients for the debt variable and one or more pension liability measures. Previous studies failed to reject the null hypothesis and concluded that the market assessment of systematic risk is not affected by the type of debt.

Due to the similarity in nature of the NPPRB liability and the pension liability, the DEBT and NPPRB coefficients were not expected to be significantly different. Significant

Table 2

Descriptive Statistics for the Sample

Year		1988	1989	1990	1991
Beta	Median	nc	1.07	1.1	0.88
	Minimum	nc	0.62	0.37	0.45
	Maximum	nc	1.93	1.68	1.63
Ubeta	Median	nc	0.570	0.500	0.44
	Minimum	nc	0.140	0.180	0.15
	Maximum	nc	1.210	1.010	1.07
Beta/Ubeta	Median	nc	1.877	2.200	2.000
Assets	Median	3029	3056	3083	3107
	Minimum	39	39	38	39
	Maximum	30,719	34,715	38,128	36,117
Debt	Median	1997	2029	1967	1940
	Minimum	15	13	12	12
	Maximum	20,774	24,677	26,119	26,160
NPPRB	Median	259	283	305	330
	Minimum	1	1	1	1
	Maximum	4716	5145	5546	5990
MVE	Median	2041	1985	1534	2227
	Minimum	11	10	6	8
	Maximum	21,367	28,336	24,854	31,537
Debt/MVE	Median	0.98	1.02	1.28	0.87
NPPRB/MVE	Median	0.97	0.87	1.05	0.83

Sample size = 54
Nc – not calculated for this period
Beta – systematic risk MVE – market value of equity
Ubeta - unlevered systematic risk
Assets - book value of total assets (millions of dollars)
Debt - book value of total liabilities (millions of dollars)
NPPRB - postretirement benefit obligation (millions of dollars)

Table 3
NPBR Sample Firms

Company name	Debt Ratio*	NPPRB Ratio**
Arvin Industries Inc	1.22	0.09
Barnes Group Inc	0.92	0.29
Champion International Corp	1.82	0.13
Clark Equipment Co	1.47	0.60
Dravo Corp	1.23	0.28
Du Pont (E.I.) De Nemours	0.59	0.19
Eastern Co	0.49	0.11
Eastman Kodak Co	1.12	0.19
Eaton Corp	0.84	0.21
Fmc Corp	1.35	0.18
Ford Motor Co Of Canada Ltd	2.04	0.34
Gatx Corp	4.00	0.12
Goodrich (B.F.) Co	0.86	0.37
Gorman-Rupp Co	0.22	0.17
Hastings Mfg Co	1.86	1.17
Lockheed Corp	1.46	0.33
Martin Marietta Corp	0.71	0.20
Mcdonnell Douglas Corp	3.81	0.88
Monsanto Co	0.65	0.13
Moore Corp Ltd	0.25	0.18
Northrop Grumman Corp	1.40	0.11
Olin Corp	1.69	0.10
Potlatch Corp	0.87	0.10
Ppg Industries Inc	0.60	0.11
Quaker State Corp	1.26	0.29
Reynolds Metals Co	1.11	0.30
Salem Corp	3.61	0.13
Scott Paper Co	1.71	0.12
Sundstrand Corp	0.75	0.24
Tasty Baking Co	0.61	0.20
Timken Co	0.88	0.57
Trw Inc	1.48	0.26
United Technologies Corp	1.70	0.12
Xerox Corp	3.73	0.15
Alliedsignal Inc	1.21	0.28
Aluminum Co Of America	0.88	0.33
American Cyanamid Co	0.40	0.09
Asarco Inc	1.63	0.09
Boeing Co	0.47	0.11
Driver Harris Co	4.66	0.22
General Dynamics Corp	1.19	0.24
Grace (W.R.) & Co	1.11	0.08
Hercules Inc	0.66	0.13
Ingersoll-Rand Co	0.47	0.15
Lukens Inc	0.53	0.35

Raytheon Co	0.49	0.09
Rogers Corp	1.34	0.13
Rohm & Haas Co	0.52	0.09
Sps Technologies Inc	0.95	0.12
Badger Meter Inc	0.84	0.31
Caterpillar Inc	1.75	0.86
Westinghouse Elec	2.66	0.19
Texas Instruments Inc	0.96	0.15
Textron Inc	3.70	0.27

* Ratio of total debt (excluding NPPRB) to market value of equity at December 13, 1991.
** Ratio of the NPPRB (the estimated NPPRB liability) to market value of equity as of December 31, 1991.

differences between the DEBT and NPPRB coefficients could be attributed to either measurement error in the estimation of the NPPRB liability proxy or to investor underassessment or overassessment of the liability. Financial news reports suggests that investors underassessed the magnitude of the NPPRB liability.

The DEBT and NPPRB coefficients for years 1989, 1990, 1991, and the pooled years (see Model 3) were tested for equality.. Panel A of Table 4 shows that the DEBT coefficient (1989 = 0.942, 1990 = 0.970, 1991 = 1.181, pooled = 0.976) for each regression is approximately twice as large as the NPPRB coefficient (1989 = 0.440, 1990 = 0.560, 1991 = 0.563, pooled = 0.389). Panel B of Table 4 indicates that the differences are highly significant in 1991 (p-value = .02) and for the pooled years (p-value = .01). In year 1990, the difference was significant at an alpha level of 10% (p-value = .075). The results from years 1990, 1991, and the pooled years suggests that the discounted amounts used as proxies for the NPPRB liabilities for years 1989 through 1991 were larger than the estimates used by market participants. Assuming that the discounted NPPRB liabilities for years 1987-1991 are reasonably accurate, it is reasonable to conclude that investors underestimated the amounts of the NPPRB liabilities in years prior to disclosure of estimates by the firms.

Summary

The results of the tests suggest that investors used nonpension postretirement benefit information in the assessment of the NPPRB liability and firm risk during years prior to 1992. A significant association between the proxy for the NPPRB liability and systematic risk was found for years 1990, 1991, and the pooled years (Table 4).

The results of this study suggest that the market may have underestimated of the liability prior to 1992. Pre-1992 financial statement and financial news disclosures regarding NPPRB liabilities generally did not disclose (1) the present value of the NPPRB

Table 4
Test Results

Model: $\beta = \alpha_0 + \alpha_1\beta_U + \alpha_2\beta_U(1\text{-}t)(DEBT/MVE) + \alpha_3\beta_U(1\text{-}t)(NPPRB/MVE) + \varepsilon$

MVE - market value of equity
NPPRB - postretirement benefit obligation
UBETA - unlevered beta
DEBT - book value of debt
B - systematic risk
B_U - unlevered beta
t - corporate tax rate

Panel A: Test of Significance of NPPRB and DEBT Coefficients

Variable		1989	1990	1991	Pooled
NPPRB	Coefficient	.44	.56	.563	.389
	P-Value	.151	.022	.025	.025
DEBT	Coefficient	.942	.97	1.181	.976
	P-Value	.001	.001	.001	.001
UBETA	Coefficient	1.041	1.056	1.015	1.005
	P-Value	.001	.001	.001	.001
CONSTANT	Coefficient	.027	.043	.014	.076
	P-Value	.742	.337	.733	.013
Adjusted R Sq		.85	.94	.931	.904
Model Significance		.001	.001	.001	.001
Panel B: Test of Equality Of DEBT and NPPRB Coefficients	P-Value	.18	.075	.02	.01

P-value - significance based on a one-tailed test except for the constant which is based on a two-tailed test.

obligation or (2) sufficient information for investors to make reliable estimates of the liability. For years 1990, 1991, and the pooled years, the DEBT coefficient was approximately twice as large as the NPPRB coefficient and the difference was significant. These differences suggest that the market undervalued the NPPRB liability in the assessment of systematic risk.

Measurement error in computing estimates of the NPPRB liability is one of several limitations of the research study. The proxy for the NPPRB liability is the amount of the NPPRB liability disclosed by firms in annual financial reports (generally from 1991 through 1993) discounted to prior years at various discount rates. This proxy provides only a rough estimate of the liability for pre-disclosure years because it does not take into consideration

firm-specific events and conditions which must be known to obtain a more accurate estimate of the liability.

Other limitations arise from the measurement of unobservable or difficult to measure variables. Total debt of the firm is measured as book value of debt rather than the sum of the market values of the components of firm debt. Book value of debt is a commonly accepted proxy for market value of debt in the accounting literature. Unlevered beta is a theoretical concept because none of the firms included in this study are unlevered. This study used the unlevered beta as modeled by Hamada (1972) to proxy for the theoretical unlevered beta.

This study contributes to both the accounting research literature and to the accounting profession. It extends the work of Dhaliwal (1986) and others on the association between systematic risk and pension liabilities. It contributes to the accounting profession by providing feedback to accounting policy makers. The tests performed in this research provided evidence that investors used information from financial statements disclosures and other nonfinancial data sources in the assessment of the NPPRB liability and firm risk.

It is expected that SFAS No. 106 will provide useful information and reduce the problem of underassessment of the NPPRB liability. SFAS No. 106 requires the disclosure of the present value of the NPPRB liability, the value of plan assets, the accrual expense, a reconciliation of changes in the net liability, assumed health care cost trend rates, and assumed discount rates. Investors can accept this information or, by applying different trend rates or discount rates, revise the disclosed estimates of the NPPRB liability.

Extensions of this study may provide additional evidence of the usefulness of disclosures required by SFAS No. 106. Based upon the results obtained for years 1989 through 1991, it is expected that the NPPRB coefficients for post 1991 years will be positive and significant and that coefficients for the DEBT and NPPRB variables will not be significantly different. These tests should provide additional evidence of the association between the NPPRB liability and systematic risk.

Endnotes:

1. For example: Interest expense is not the total interest expense during a time period but rather the interest expense for the period divided by the common shares outstanding at the beginning of the period.

2. The eight percent threshold is imposed for the purpose of eliminating firms which have immaterial NPPRB obligations and to increase the chance of detecting a relationship (if one exists) between the NPPRB liability and systematic risk.

3. SFAS No. 106, paragraph 31, requires the use of discount rates which approximate the rate of return on ?high-quality fixed-income investments.@ Treasury bond rates (10-year and composite) and Aaa corporate bond yields as of the end of December for years 1986 through 1990 are chosen to discount estimated December 1991 NPPRB liabilities to years 1990, 1989, 1988, and 1987. Since there are little or no differences in the regression results among the various discount rates, only the results based upon 10-year Treasury bond rates are presented.

4. Growth in total assets is measured by the following. The change in total assets (TA) over the period of 1988 to 1991 (referred to as the 1988-91 TA ratio) is computed as: TA at end of December, 1991, divided by TA at end of December, 1987, multiplied by 100. Yearly changes in total assets from years 1988 through 1991 (referred to as the yearly TA ratios) are computed as: TA at end of December, year t, divided by TA at end of December, year t-1, multiplied by 100.

Over the period 1988 to 1991, the median 1998-91 TA ratio for a sample of 337 providers was approximately 115 percent (i.e., the median firm increased in size (TA) by approximately 15 percent). Approximately 80 percent of the firms had a 1998-91 TA ratio in the range of 80 to 155 percent. Firms for which the 1998-91 TA ratio was less than 80 percent or greater than 155 percent were eliminated from the sample.

Yearly TA ratios are computed for years 1988 to 1989, 1989 to 1990, and 1990 to 1991. The median yearly TA ratio for the sample of 337 providers is approximately 105 percent. Approximately 79 percent of the yearly TA ratios are within the range of 90 to 120 percent. For all firms and for all years, yearly TA ratios less than 90 percent or greater than 120 percent are identified. A firm is deleted from the sample if ratios outside of the range of 90 to 120 percent were noted for two or more of the three years.

5. Ideally sample firms should have relatively constant leverage (D/E) over the period 1988 through 1991. For each firm the A88-91 D/E ratio@ is defined as: average debt (years 1988-91) divided by the average equity (years 1988-91). Debt is measured at book value and equity is measured at market value. For the initial sample of 337 providers, the stability of the leverage ratio is measured by computing the following: the D/E ratio for a given year (called the yearly D/E ratio) divided by the 88-91 D/E ratio (such as IBM=s D/E ratio for year 1990 divided by IBM=s average D/E ratio for the period 1988 to 1991). This ratio is referred to as the Aleverage variation ratio.@

The median leverage variation ratio for all firm/year observations is 97 percent. Approximately 84 percent of the leverage variation ratios were within the range of 65 to 130 percent. For all of the sample firms, leverage variation ratios less than 65 percent and greater than 130 percent are identified. If leverage variation ratios outside of the range of 65

to 130 percent were identified for three or more of the four years for any firm, the firm was dropped from the sample.

6. An estimate of the tax rate of each firm (i.e., a firm=s tax expense divided by its pretax income) for years 1988 through 1991 was obtained from Compustat. This measure is commonly accepted in accounting research as a surrogate for the effective tax rate. Yearly tax rates less than 17% or greater than 57% are identified for each firm. If tax rates outside of the 17 to 57 percent range were identified for three or more of the four years for a firm, the firm was dropped from the sample.

7. If the calculated beta (ubeta) for a particular year was not significant at an alpha level of ten percent, the firm was omitted from the sample for that year. As a result, not every firm was used in each year=s regression.

8. For year 1989, beta and unlevered beta for each firm were calculated using monthly returns from a twenty-six month period beginning November 1987. The month of the stock market crash (October) and prior months were eliminated in the calculations. Elimination of these months did not significantly change the results.

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